

the smooth *pahoehoe* was much more richly covered with vegetation, which occurred, however, only in cracks. On a 1907 flow plants were found just beginning to be established. The author concludes that on both types of lava, the first pioneers are lower cryptogams; on the *pahoehoe* these are soon succeeded by ferns and seeds plants, but on the *aa* there is a long-enduring lichen stage. Ultimately the natural forest of the region returns, except in places where man's influence causes the successful invasion of a naturalized flora. The *ohia* (*Metrosideros polymorpha*) is the dominating tree at first, and the *koa* (*Acacia koa*) is the dominating tree of the ultimate or climax forest.—H. C. COWLES.

**Rainfall and soil moisture.**—In studying the conditions which govern the plant activities of the semi-arid region about the Desert Laboratory, Tucson, Arizona, SHREVE<sup>13</sup> has made weekly determinations of the soil moisture at depths of 3, 15, and 30 cm. throughout the year, and compared the resulting data with the record of the rainfall for the same period, in order to see exactly how the former is affected by the latter. It is evident that precipitation of less than 0.15 inch has no effect upon the soil moisture, and that therefore there are periods of 140 days in the region under consideration without rainfall of sufficient amount to increase the moisture in the soil. This serves to indicate that in desert regions by no means all of the small rainfall is significant to vegetation as a source of water supply. The evaporation has been determined and plotted along with its ratio to the soil moisture, the march of soil moisture throughout the year, and the distribution of rainfall, making an instructive and detailed chart of those moisture factors which affect vegetation. Among other things it proves the range of moisture conditions at the Desert Laboratory to be one of great extremes.—G. D. FULLER.

**Drought resistance in Hopi maize.**—For centuries the Indians of New Mexico and Arizona have grown a race of maize in soil that is much too dry for the ordinary races of the species. A large factor in the success of this race, known as Hopi maize (from the Hopi Indians), is the extraordinary capacity for elongation possessed by the mesocotyl.<sup>14</sup> The Indians are accustomed to plant their maize at a depth of 15–45 cm.; this depth is for most varieties too great for effective germination. In ordinary races the mesocotyl can rarely be forced to grow to a length greater than 10 cm., whereas a length of 36 cm. can be induced in Hopi maize. Another advantage in the mesocotyl of Hopi maize is its ability to produce roots, a rare phenomenon in grass internodes. A third feature of great importance is the great elongation of the primary root

<sup>13</sup> SHREVE, F., Rainfall as a determinant of soil moisture. *Plant World* 17:9–26. figs. 3. 1914.

<sup>14</sup> COLLINS, G. N., A drought-resisting adaptation in seedlings of Hopi maize. *Jour. Agric. Research* 1:293–302. figs. 2. pls. 29–32. 1914.